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# **Polarization extinction ratio and polarization dependent intensity noise in long-pulse supercontinuum generation (Conference Presentation)**

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## **ABSTRACT**

We investigate the polarization of supercontinuum generated in nominally non-birefringent silica photonic crystal fibers over the entire spectrum of the source (450-2400 nm). We demonstrate that the degree of polarization varies over the spectrum but that some parts of the spectrum show stable polarization extinction ratios (PER) of over 10 dB. We experimentally demonstrate how the spectrally resolved polarization develops with increasing power and along the length of the nonlinear fiber. The experimental results are compared to numerical simulations of coupled polarization states mimicking the experimental conditions. Subsequently, a single-shot pulse-to-pulse polarization dependent relative intensity noise (PD-RIN) was measured and the noise characteristics were analyzed using long-tailed and rogue wave statistics. To do this, we used a range of 10 nm narrow bandpass filters (BPF) between 550 nm to 2200 nm, and fast photo detectors, to record 800 consecutive pulses. Peaks from these pulses are first extracted, then distribution of their pulse height histogram (PHH) is constructed. Analysis using higher-order moments about the mean (variance, skewness and kurtosis) showed that: (1) around the pump wavelength of 1064nm, the PD-RIN is lowest, PHH exhibits a Gaussian distribution, and higher order moments are zero, (2) further away from pump, PD-RIN increases in parabolic fashion, PHH follows a left-skewed long-tailed Gamma distribution, and higher-order moments increase. Spectrally, the difference of the PD-RIN in the two orthogonal axes increases with PER.

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